

REMARKS¹

In the outstanding Office Action, the Examiner made the following rejections:

- 1) Claims 15-20 under 35 U.S.C. § 101;
- 2) Claims 1 and 3-4 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,272,236 to Pierrat (*Pierrat*) in combination with U.S. Patent No. 5,838,433 to Hagiwara (*Hagiwara*), U.S. Patent Publication No. 2003/0042493 to Kazakevich (*Kazakevich*) and U.S. Patent No. 6,064,484 to Kobayashi et al. (*Kobayashi*);
- 3) Claim 2, 6, and 7² under 35 U.S.C. § 103(a) as being unpatentable over *Pierrat* in combination with *Hagiwara*, *Kazakevich* and *Kobayashi*, and further in view of U.S. Patent No. 6,373,054 to Hiroi et al. (*Hiroi*);
- 4) Claim 5 under 35 U.S.C. § 103(a) as being unpatentable over *Pierrat* in combination with *Hagiwara*, *Kazakevich* and *Kobayashi*, and further in view of U.S. Patent No. 7,221,788 to Schulze et al. (*Schulze*);
- 5) Claims 8, 10-11, and 13-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,222,195 to Yamada et al. (*Yamada*) in combination with *Hagiwara*, *Kazakevich* and *Kobayashi*;

¹ As Applicant's remarks with respect to the Examiner's rejections are sufficient to overcome these rejections, Applicant's silence as to certain assertions or requirements applicable to such rejections (e.g., whether a reference constitutes prior art, motivation to combine references, etc.) is not a concession by Applicant that such assertions are accurate or such requirements have been met, and Applicant reserves the right to analyze and dispute such in the future.

² At page 9 of the Office Action the Examiner indicates that claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of references consisting of *Pierrat*, *Hagiwara*, *Kazakevich*, *Kobayashi*, and *Hiroi*. However, at page 10 of the Office Action, the Examiner proceeds to reject claims 6 and 7 under 35 U.S.C. § 103(a) as being unpatentable over the same combination of references. Accordingly, Applicant assumes that claims 2, 6, and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Pierrat*, *Hagiwara*, *Kazakevich*, *Kobayashi*, and *Hiroi*.

6) Claim 9 under 35 U.S.C. § 103(a) as being unpatentable over *Yamada* in combination with *Hagiwara*, *Kazakevich* and *Kobayashi*, and further in view of *Hiroi*, and

7) Claim 12 under 35 U.S.C. § 103(a) as being unpatentable over *Yamada* in combination with *Hagiwara*, *Kazakevich* and *Kobayashi*, and further in view of *Schulze*.

By this amendment, Applicant amends claims 1, 8, and 15. Claims 1-20 remain pending in this application.

I. Claim Rejections Under 35 U.S.C. § 101

Regarding the rejection of claims 15-20 under 35 U.S.C. § 101, the Examiner asserts that the subject matter of these claims do not fall within one of the four statutory categories of invention because Applicant has not provided explicit and deliberate definitions of "receiving", "analyzing", or "responding." See Office Action, page 3. Based on this assertion, the Examiner has concluded that the subject matter recited in claims 15-20 do not satisfy the machine-or-transformation test set forth by the Federal Circuit in *In re Bilski* 545 F.3d 943 (Fed. Cir. 2008) (en banc). *Id.* This is incorrect.

Claim 15 recites, *inter alia*, "[a] method for manufacturing a semiconductor device" which includes "executing an inspection processing of an exposure tool," "coating a surface of an inspection target substrate," "placing a plurality of imaging components ... on a surface of the inspection resist film," "forming a plurality of inspection patterns," "coating a semiconductor substrate with a manufacturing resist film," "loading a manufacturing photomask and the semiconductor substrate to the exposure tool," and "subjecting the semiconductor substrate to a manufacturing process

of a semiconductor device by delineating the manufacturing resist film using the manufacturing photomask." Claim 15, among other things, transforms the claimed "inspection resist film" by "coating," and "placing a plurality of imaging components" thereon. Moreover, data obtained from "measuring one of the inspection patterns," is used to provide a correction for the claimed "exposure tool" which is used in manufacturing a semiconductor device from a semiconductor wafer. Accordingly, data obtained from the claimed "inspection processing" may be ultimately transformed into correction for the claimed "exposure tool" and the claimed wafer is transformed into the claimed "semiconductor device." Claim 15 therefore transforms a particular article into a different state or thing and satisfies at least the transformation prong of the machine-or-transformation test.

Furthermore, the claimed method "executing an inspection processing of an exposure tool," and "loading a manufacturing photomask and the semiconductor substrate to the exposure tool" is tied to a machine: the exposure tool. The method recited in claim 15 is therefore tied to at least the claimed "exposure tool," and therefore also satisfies the machine prong of the machine-or-transformation test.

Accordingly, for at least the reasons presented above, claim 15 satisfies the machine-or-transformation test set forth in *In re Bilski*. Applicant respectfully submits that independent claim 15 and dependent claims 16-20 recite patentable subject matter. Applicant therefore respectfully requests that the Examiner withdraw the rejection of claims 15-20 under 35 U.S.C. § 101.

II. Claim Rejections under 35 U.S.C. § 103(a)

Applicant respectfully traverses the rejection of claims 1-14 under 35 U.S.C. § 103(a). No *prima facie* case of obviousness is established.

The key to supporting any rejection under 35 U.S.C. § 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. Such an analysis should be made explicit and cannot be premised upon mere conclusory statements. MPEP § 2142, 8th Ed., Rev. 7 (July 2008). "A conclusion of obviousness requires that the reference(s) relied upon be enabling in that it put the public in possession of the claimed invention." MPEP § 2145. Furthermore, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art" at the time the invention was made. MPEP § 2143.01(III), internal citation omitted. Moreover, "[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious." MPEP § 2141.02(I), internal citations omitted (emphasis in original).

"[T]he framework for the objective analysis for determining obviousness under 35 U.S.C. § 103 is stated in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). . . . The factual inquiries . . . [include determining the scope and content of the prior art and] . . . [a]scertaining the differences between the claimed invention and the prior art." MPEP § 2141(II). "Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art." MPEP § 2141(III).

In this application, a *prima facie* case of obviousness has not been established because the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the claimed invention and the prior art. Accordingly, the Office Action has failed to clearly articulate a reason why the prior art would have rendered the claimed invention obvious to one of ordinary skill in the art.

A. Claims 1, 3, and 4

Claim 1, as amended, recites a combination including, *inter alia*, “placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film,” and “forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components.” The applied references, whether taken alone or in combination, fail to disclose or suggest at least these elements. Moreover, the applied references substantially differ from the claimed embodiments and cannot achieve the effectiveness in any reasonable combination thereof, of the claimed embodiments, which may make it possible to implement inspection processing of an illumination optical system within a short time by comparing the inspection image data with the arbitrarily selected reference image data.

Pierrat discloses that a technique for inspecting photomasks employs images of the resist pattern (See Abstract), and the pattern is transferred to a photoresist coating on the wafer surface (See col. 1 lines 32-34). However, *Pierrat* provides no disclosure or suggestion of a combination including, *inter alia*, “placing a plurality of imaging

components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film,” and “forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components,” as recited in amended claim 1 (emphasis added).

Hagiwara fails to cure the deficiencies of *Pierrat*. *Hagiwara* discloses that scattering light occurring from each point on the scanning line LCR is condensed by four objective lenses L101, L201, LL1, LL2 to be photoelectrically converted by sixteen photoelectric conversion elements, light detecting surfaces of which are positioned on pupil-conjugate planes of the objectives (PP plane 1, PP plane 2, PP plane 1L, PP plane 2L) (*See* col. 23, lines 44-51, col. 27, line 65 - col. 18, line 2, and FIGS. 31A and 37), and the objective lenses are disposed at positions in plane symmetry with respect to the pattern-scribed surface of the reticle R (*See* col. 30, lines 56-67, and FIG. 40). Although *Hagiwara* discloses placing optical lenses L101, L201, LL1, and LL2 on different optical axes AX101, AX201, AX1L, and AX2L, *Hagiwara* provides no disclosure or suggestion of “placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film,” as recited in amended claim 1 (emphasis added). Moreover, *Hagiwara* also provides no disclosure or suggestion of “forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components,” as also recited in amended claim 1 (emphasis added).

Kazakevich fails to cure the deficiencies of *Pierrat* and *Hagiwara*. *Kazakevich* discloses a solid state light source in which first plate 80 and second plate 82 are spaced such that the first plate is positioned so the active regions of LED 94 are at a first optical conjugate plane 106 of each lens 98, and third plate 84 and second plate 82 are spaced so that a second optical conjugate plane 104 of each lens 98 coincides with an entrance 93 of each of the corresponding fiber lines 100. See *Kazakevich*, paragraph [0063], and FIGS. 9 and 10. However, *Kazakevich*, being directed to a solid state light and not being concerned with "[a]n inspection method for an illumination optical system of an exposure tool," is silent with respect to a combination including, *inter alia*, "placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film," and "forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components," as recited in amended claim 1 (emphasis added). Moreover, a person having ordinary skill in the art would not look to the teachings of *Kazakevich* to cure the deficiencies of *Pierrat* and *Hagiwara* because *Kazakevich* is unrelated and non-analogous art.

Kobayashi also fails to cure the deficiencies of *Pierrat*, *Hagiwara*, and *Kazakevich*. *Kobayashi* generally discloses a pattern inspection method in which the read data is converted to generate reference image data, the image data is picked up from the actual pattern, the actual image data and the reference image data are synthesized, and a die-to-die comparison inspection is performed. See, e.g., *Kobayashi*, FIG. 2, and col. 5, line 59 - col. 6, line 19. *Kobayashi*, however, provides no

disclosure or suggestion of a combination including, *inter alia*, “placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film,” and “forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components,” as recited in amended claim 1 (emphasis added).

Accordingly, the elements recited in amended claim 1 are neither taught nor suggested by the applied references. Nor has the Examiner explained how teachings of the references could be modified to achieve the claimed combination. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why claim 1 would have been obvious to one of ordinary skill in the art in view of the prior art. Therefore, a *prima facie* case of obviousness has not been established for claim 1.

Accordingly, claim 1 is allowable. Moreover, claims 3 and 4 are allowable at least due to their dependence from claim 1. Applicant therefore respectfully requests that the Examiner withdraw the rejection of claims 1, 3, and 4 under 35 U.S.C. § 103(a).

B. Claims 2, 6, and 7

Claims 2, 6, and 7 depend from claim 1 and thus require all of the elements recited in claim 1. As discussed above, *Pierrat, Hagiwara, Kazakevich* and *Kobayashi* fail to disclose or suggest a combination including at least “placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating

from an optical conjugate plane of a surface of the resist film," and "forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components," as recited in claim 1 and required by claims 2, 6, and 7. *Hiroi* fails to cure the deficiencies of *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi*.

The Examiner cites to *Hiroi* for allegedly teaching "the reference image data and the inspection image data are at least one of a brightness of the inspections image of the inspection pattern and a shape of the inspection pattern." Office Action, page 9. Such alleged teachings, even if combinable with *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi*, fail to cure the deficiencies of *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi*. That is, *Hiroi* also fails to disclose a combination including at least "placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film," and "forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components," as recited in claim 1, and required by claims 2, 6, and 7. Nor has the Examiner explained how teachings of the references could be modified to achieve the claimed combination.

A *prima facie* case of obviousness has thus not been established for claims 2, 6, and 7. Claims 2, 6, and 7 are therefore allowable. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claims 2, 6, and 7 under 35 U.S.C. § 103(a).

C. Claim 5

Claim 5 depends from claim 1 and thus requires all of the elements recited in claim 1. As discussed above, *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi* fail to disclose or suggest a combination including at least "placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film," and "forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components," as recited in claim 1 and required by claim 5. *Schulze* fails to cure the deficiencies of *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi*.

The Examiner cites to *Schulze* for allegedly teaching "imaging components are a plurality of lenses in a lens array." Office Action, page 9. Such alleged teachings, even if combinable with *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi*, fail to cure the deficiencies of *Pierrat*, *Hagiwara*, *Kazakevich* and *Kobayashi*. That is, *Schulze* also fails to disclose a combination including at least "placing a plurality of imaging components provided on a front surface of a photomask, the front surface deviating from an optical conjugate plane of a surface of the resist film," and "forming a plurality of inspection patterns of the resist film having a plurality of openings, by development after projecting exposure beams output from a plurality of effective light sources onto the resist film via the imaging components," as recited in claim 1, and required by claim 5. Nor has the Examiner explained how teachings of the references could be modified to achieve the claimed combination.

A *prima facie* case of obviousness has thus not been established for claim 5. Claim 5 is therefore allowable. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claim 5 under 35 U.S.C. § 103(a).

D. Claims 8, 10, 11, 13, 14

Claim 8, as amended, recites a combination including “inspection patterns formed by development after projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided on a front surface of a photomask, the imaging components placed so that the front surface deviates from an optical conjugate plane of the surface of the resist film.” The applied references, whether taken alone or in combination, fail to disclose or suggest at least this element.

Yamada discloses the control unit 150 of the electron-beam exposure device 100, including a data-management unit 153 storing exposure data in a buffer memory 154 and sending the sub-deflection data to a sub-deflector-deflection setting unit 155. *See Yamada*, col. 2, lines 5-26, and Fig. 1. *Yamada* further discloses “the sub-deflection data is broken down into shot data by a pattern generating unit 156, and is corrected by a pattern correction unit 157.” *Id.*, at col. 2, lines 27-29. However, *Yamada* provides no disclosure or suggestion of a combination including “inspection patterns formed by development after projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided on a front surface of a photomask, the imaging components placed so that the front surface deviates from an

optical conjugate plane of the surface of the resist film,” as recited in amended claim 8 (emphasis added).

For at least the reasons presented above with respect to claim 1, neither *Hagiwara* nor *Kazakevich*, nor *Kobayashi* disclose or suggest a combination including “inspection patterns formed by development after projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided on a front surface of a photomask, the imaging components placed so that the front surface deviates from an optical conjugate plane of the surface of the resist film,” as recited in amended claim 8 (emphasis added). Moreover, as also discussed above, a person having ordinary skill in the art would not look to the teachings of *Kazakevich* to cure the deficiencies of *Yamada*, *Hagiwara*, and *Kobayashi* because *Kazakevich* is unrelated and non-analogous art. Accordingly, neither *Hagiwara* nor *Kazakevich*, nor *Kobayashi* cure the deficiencies of *Yamada*.

Therefore, the elements recited in amended claim 8 are neither taught nor suggested by the applied references. Nor has the Examiner explained how teachings of the references could be modified to achieve the claimed combination. Consequently, the Office Action has neither properly determined the scope and content of the prior art nor properly ascertained the differences between the prior art and the claimed invention. Accordingly, no reason has been clearly articulated as to why claim 8 would have been obvious to one of ordinary skill in the art in view of the prior art. Therefore, a *prima facie* case of obviousness has not been established for claim 8.

Accordingly, claim 8 is allowable. Moreover, claims 10, 11, 13, and 14 are allowable at least due to their dependence from claim 8. Applicant therefore respectfully requests that the Examiner withdraw the rejection of claims 8, 10, 11, 13, and 14 under 35 U.S.C. § 103(a).

E. Claim 9

Claim 9 depends from claim 8 and thus requires all of the elements recited in claim 8. As discussed above, *Yamada*, *Hagiwara*, *Kazakevich* and *Kobayashi* fail to disclose or suggest a combination including at least “inspection patterns formed by development after projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided on a front surface of a photomask, the imaging components placed so that the front surface deviates from an optical conjugate plane of the surface of the resist film,” as recited in claim 8 and required by claim 9. *Hiroi* fails to cure the deficiencies of *Yamada*, *Hagiwara*, *Kazakevich* and *Kobayashi*.

The Examiner cites to *Hiroi* for allegedly disclosing “the reference image data and the inspection image data include at least one of a brightness of the inspection image of the inspection pattern and a shape of the inspection pattern.” Office Action, page 17. Such alleged teachings, even if combinable with *Yamada*, *Hagiwara*, *Kazakevich* and *Kobayashi*, fail to cure the above-noted deficiencies of *Yamada*, *Hagiwara*, *Kazakevich* and *Kobayashi*. That is, *Hiroi* also fails to disclose a combination including at least “inspection patterns formed by development after projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided

on a front surface of a photomask, the imaging components placed so that the front surface deviates from an optical conjugate plane of the surface of the resist film," as recited in claim 8, and required by claim 9. Nor has the Examiner explained how teachings of the references could be modified to achieve the claimed combination.

A *prima facie* case of obviousness has thus not been established for claim 9. Claim 9 is therefore allowable. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claim 9 under 35 U.S.C. § 103(a).

F. Claim 12

Claim 12 depends from claim 8 and thus requires all of the elements recited in claim 15. As discussed above, *Yamada, Hagiwara, Kazakevich* and *Kobayashi* fail to disclose or suggest a combination including at least "inspection patterns formed by development after projecting exposure beams output from a plurality of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided on a front surface of a photomask, the imaging components placed so that the front surface deviates from an optical conjugate plane of the surface of the resist film," as recited in claim 8 and required by claim 12. *Schulze* fails to cure the deficiencies of *Yamada, Hagiwara, Kazakevich* and *Kobayashi*.

The Examiner cites to *Schulze* for allegedly disclosing "the imaging components are a plurality of lenses in a lens array." Office Action, page 18. Such alleged teachings, even if combinable with *Yamada, Hagiwara, Kazakevich* and *Kobayashi*, fail to cure the above-noted deficiencies of *Yamada, Hagiwara, Kazakevich* and *Kobayashi*. That is, *Schulze* also fails to disclose a combination including at least "inspection patterns formed by development after projecting exposure beams output from a plurality

of effective light sources onto the resist film coated on a surface of an exposure target substrate by a plurality of imaging components provided on a front surface of a photomask, the imaging components placed so that the front surface deviates from an optical conjugate plane of the surface of the resist film," as recited in claim 8, and required by claim 12. Nor has the Examiner explained how teachings of the references could be modified to achieve the claimed combination.

A *prima facie* case of obviousness has thus not been established for claim 12. Claim 12 is therefore allowable. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of claim 12 under 35 U.S.C. § 103(a).

III. Conclusion

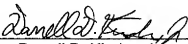
In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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